

# Pneumatic Power Motors

Durability. Dependability. Industry leading technology.



# Typical End-Users

- Foundries
- Paper Mills
- Machine Manufacturers
- Power Plants
- Back-Up Units (for electric motors)
- OEM

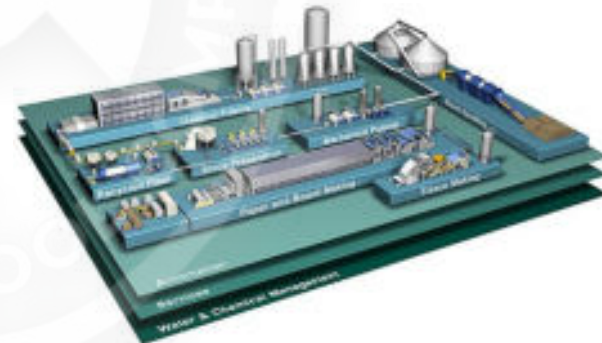
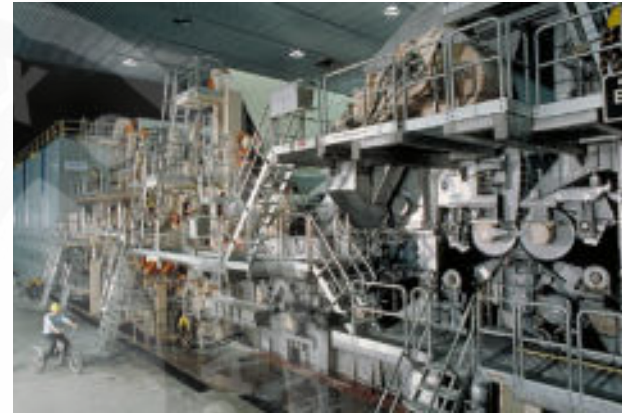
# Applications

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OEM Pipeline  
Installation



Paper Mills



# 3 Types of Power

ered



- Rotary Vane

- Axial Piston

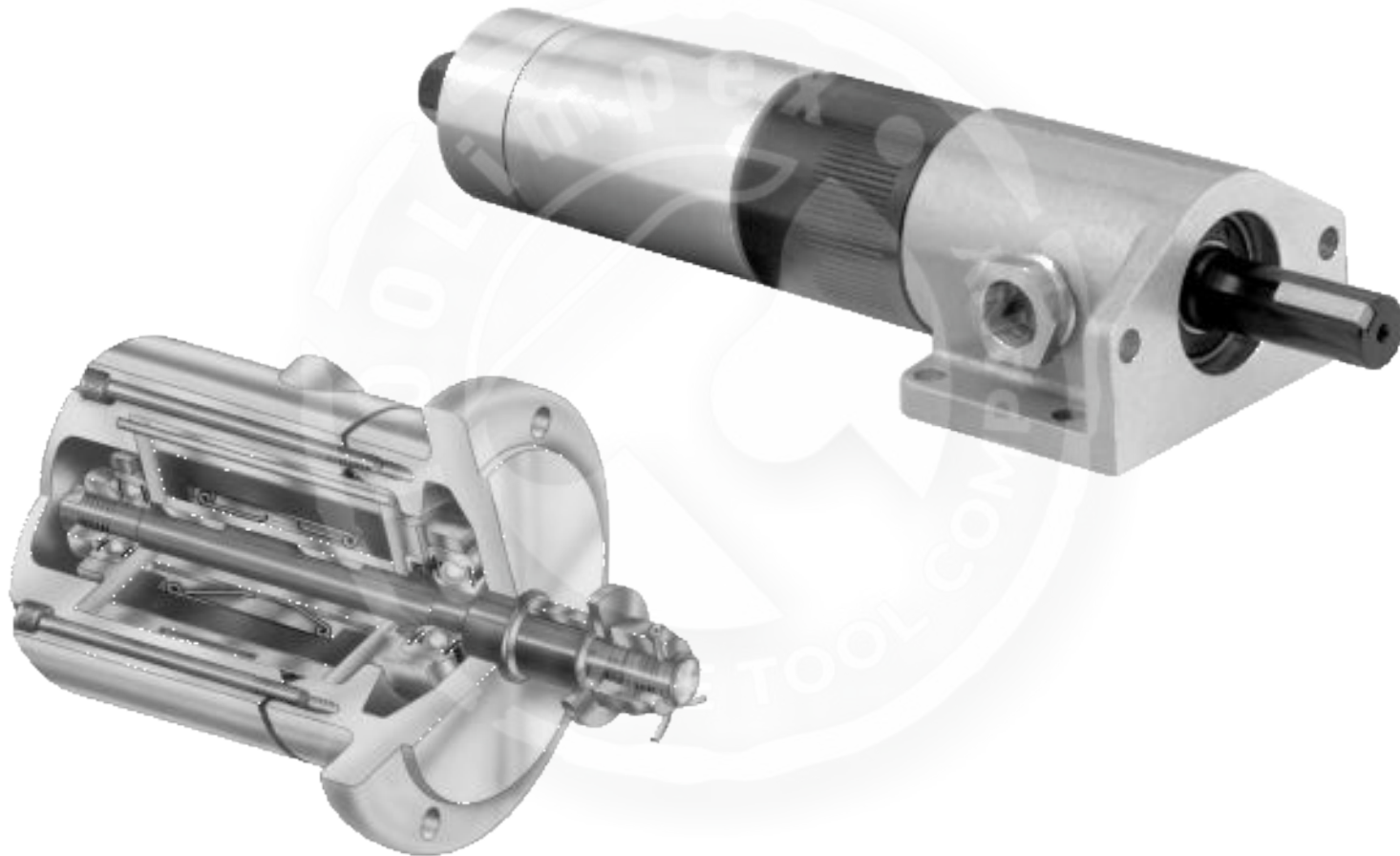


- Radial Piston

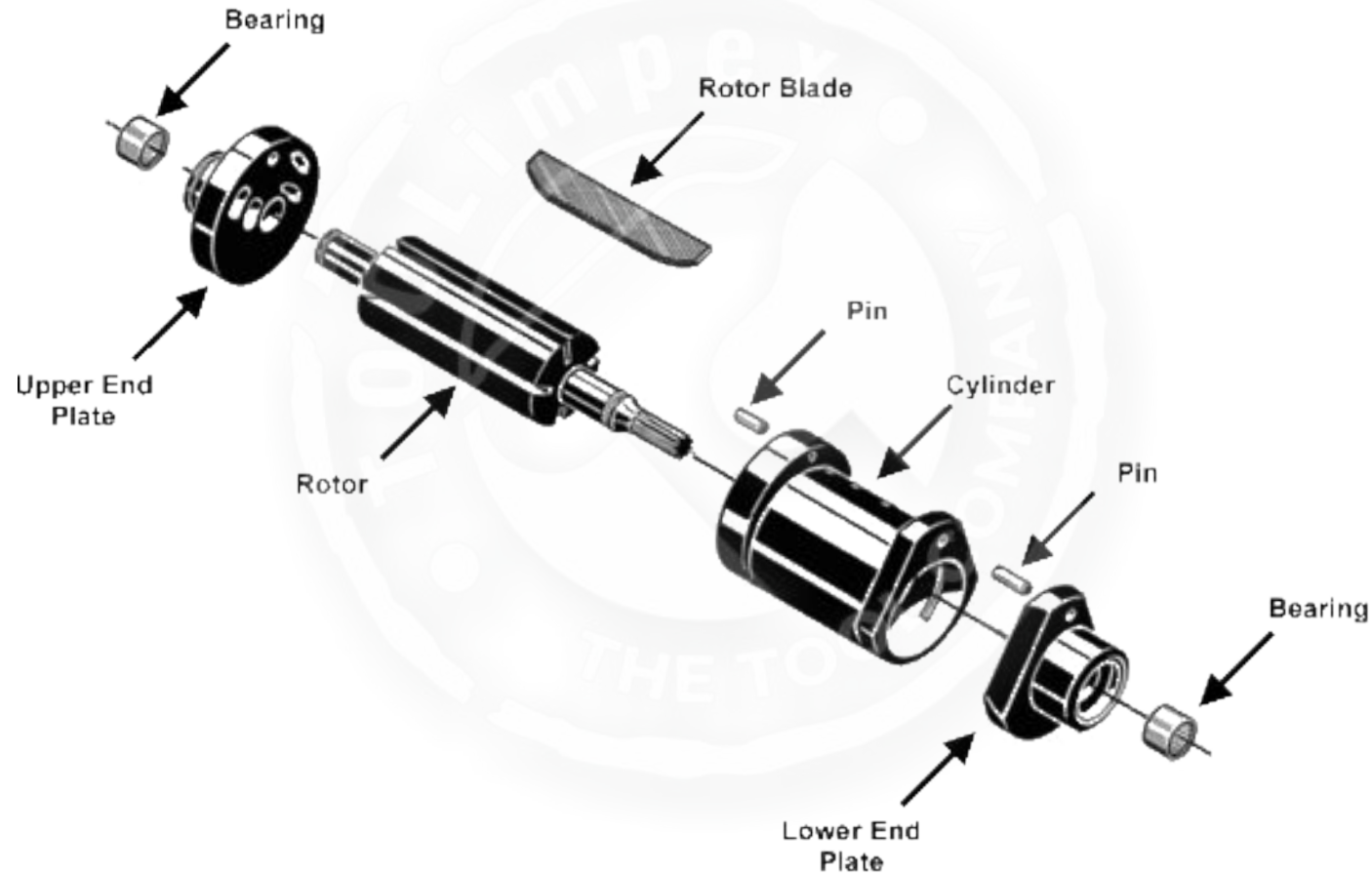
# Rotary Vane Motors

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# Rotary Vane Motors



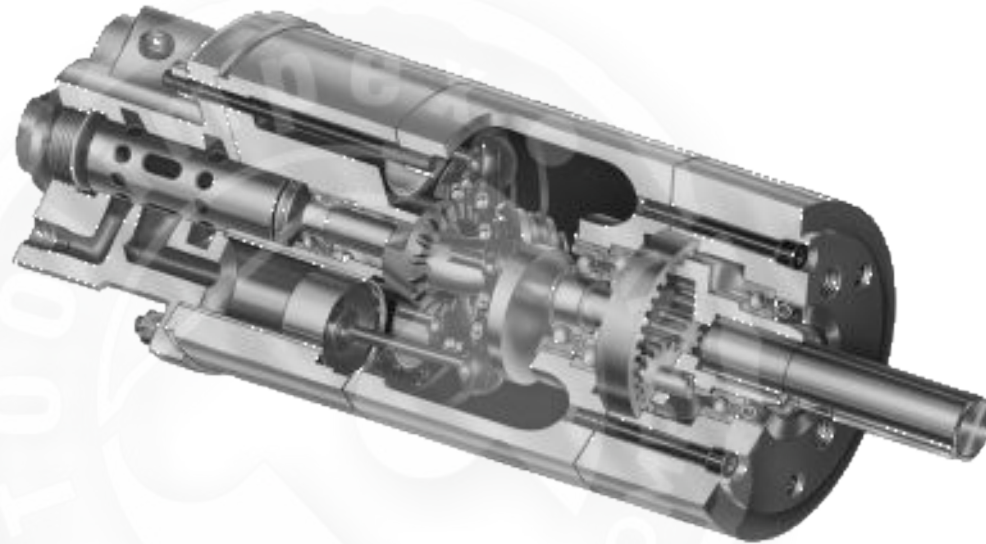
# Rotary Vane Motors

- Most common pneumatic power motor type
- High speed units that deliver a high ratio of power to weight
- Available as single-directional or reversible
- Single-directional motors can be in clockwise or counter-clockwise rotation configuration

# Axial Piston Motors

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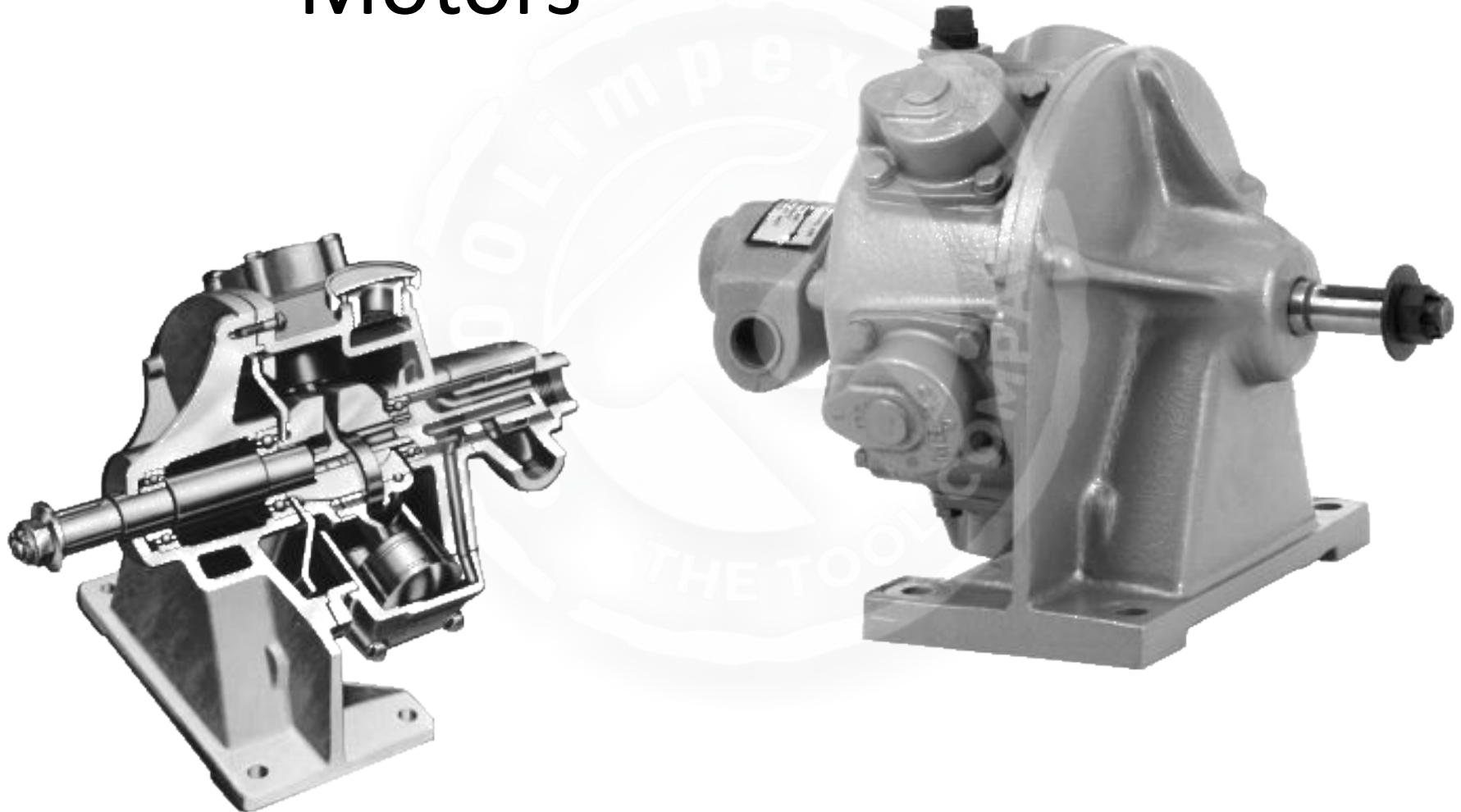
# Axial Piston Motors

- Cleco is the exclusive brand of Axial Piston Motors
- Despite their relatively small size, Axial Piston motors develop high speed & power
- High torque is an inherent characteristic of the Axial Piston motor making them especially desirable for applications involving heavy starting loads

# Radial Piston Motors

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# Radial Piston

## Motors

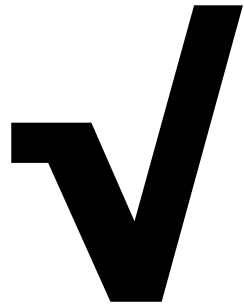
- The Radial Piston air motor is very similar to an early vintage radial piston aircraft engine, except that it is powered by air instead of fuel
- Radial piston motors are available in four, five or six cylinders
- Output torque is developed by pressure on the piston within each cylinder

# Air or Electric

## Motors

Characteristic	Air Motors	Electric Motors
Size & Weight	Relative light and compact, especially in smaller sizes	Generally heaviest & most bulky
Operating Safety	Explosion proof	Explosion proof housing available at extra costs.
Reversibility	Easily reversed	Reversing limited by inertia and heat build-up
Maintenance Safety	Safe for general maintenance personnel	Shock hazard; maintained by special craftsmen
Temperature Limits	To 121°C; Intermittent use; motor runs below ambient	To 40°C; motor runs hotter than ambient

# Sizing the Motor - A



## e of Thumb!

Choose a motor size that will produce the required torque & horsepower using about 2/3 of the available air line pressure

# Rotary Vane Motors

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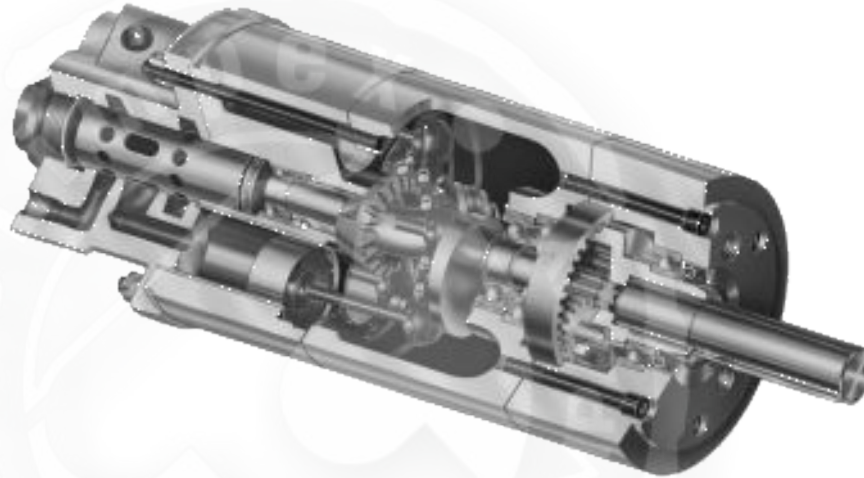
0,3HP to 7,5HP Range  
Many Sizes & Configurations

# Rotary Vane Motors

## Two types:

- Large (MR Series – 1,0 to 7,5 hp)
  - Small to Medium (Various series – 0,3 to 2,3 hp)
- 
- All motors feature durable construction with precision heavy duty bearings throughout & multiple blade rotors for smooth power
- 
- Wide range of speeds and torque as well as a choice of foot, face or flange mounting

# Axial Piston Motors



0,6HP to 2,7HP Range  
4 Sizes (A2, B4, A6 & A8)

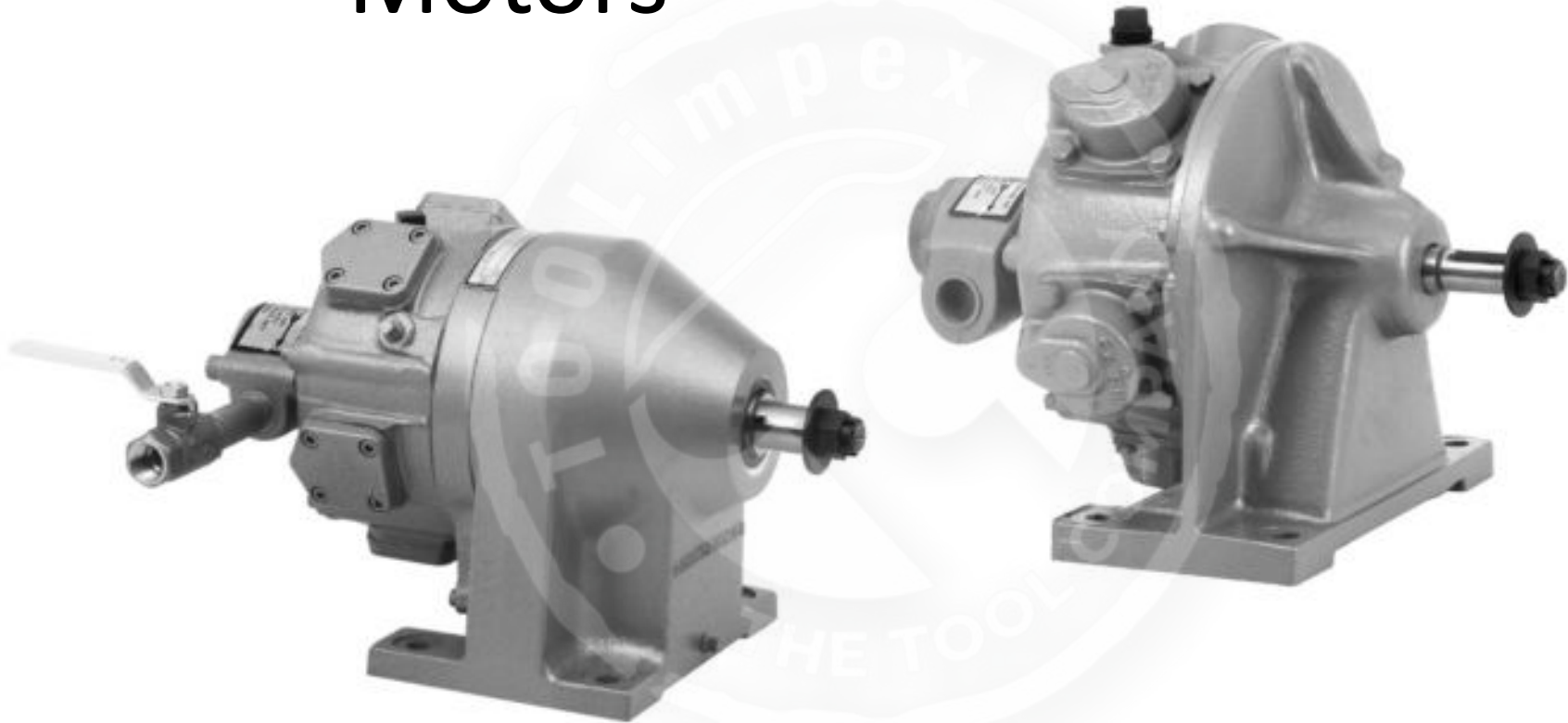
# Axial Piston Motors

- These small lightweight Cleco motors are ideal for installation in close quarters
- Long life with minimum maintenance
- Generous size spindle bearings permit overhung weight on spindle with no external support
- High torque is an inherent characteristic of Piston type air motors making them especially desirable for applications involving heavy starting loads

# Axial Piston Motors

- Ideal for start-stop operations
- Not recommended to be operated at speeds greater than 75% of free speeds
- Enclosed type construction allows operation in corrosive or dusty environments
- Performs in high temperature environments (93°C)

# Radial Piston Motors



1,5 HP to 15 HP Range  
6 Sizes (MA2, MA3, MB, ME, MK & MM)

# Radial Piston

## Motors

- Heavy duty construction make these motors suitable for continuous operation
- The counter-balanced crankshaft is supported by anti-friction bearings
- A slinger distributes oil to all moving parts of the motor

# Radial Piston

## Motors

- Radial Piston motors should be operated under load & in a horizontal position
- It is not recommended that these motors be operated at speeds greater than 75% of free speed
- These motors perform in high temperature areas up to 93 °C

# Selecting the right

## Mountable Power Motors

### Choose the right Air Motor to fit your application

Apex Tool Group's air motors are engine class air motors cover a wide range of advantages: powering air driven machinery, rotating a turntable, mixing paint, power source for mechanical hands or universal

#### Rotary Vane Air Motors

Apex Tool Group offers two types of rotary vane air motors: 1/2 to 2.5 hp with spring loaded or 2.5 to 10 hp. All motors feature durable cast bearings throughout, and multiple blades wide range of speeds and torques as well as mounting. These motors feature air line mounting. Mount the lubricator as close to the motor as possible in high temperature areas.

#### Axial Piston

These small, lightweight Cleco motors are rugged construction and precision long life with minimum maintenance. Geometric weight on spindle with no extra weight. High torque is an inherent characteristic especially desirable for applications that require power impulses in axial piston air motor power in either direction of rotation. The load and horizontally. Axial piston motors are not recommended that they be operated at high speeds. Their enclosed type construction atmosphere. These motors perform at 2000-5000 C.P. Grease fittings are provided or lines be equipped with filters and lubricate the motor as possible.

#### Radial Piston

Heavy-duty construction make these motors the counterbalanced crankshaft is supported distributed or to all moving parts of the motor. High torque is an inherent characteristic especially desirable for applications that require power impulses in radial piston air motor power in either direction of rotation. At least two of these motors should be operated under recommended that they be operated at. These motors perform satisfactorily in high C.P. It is recommended that air lines be lubricated as close to the motor as possible.

## Mountable Power Motors

Cleco

### Air Motor Selection

To assist in the selection of an air motor, we need any two of the following three items of information:

1. Horsepower required;
2. Speed (RPM) required against load;
3. Work load expressed in foot pounds or inch pounds of dynamic torque (moving torque load).

As air motors are dependent upon input air pressure for performance, these factors must also be considered:

1. Air pressure (gpg or bars) at motor location;
2. Pipe size of air supply system to assure adequate volume (gpm or m³/min) so as to minimize line loss (air pressure drop during motor operation);
3. Plant air system pressure may vary during the day due to use by other equipment; therefore, base the selection of the air motor on the lowest gpg or bars that can be expected. Then, by using a pressure regulator in the line at the motor, a uniform air supply is assured.

In applications of intermittent short service, Cleco air motors can be operated over the complete range indicated for each without harm or significant wear. In applications involving sustained continuous operation for long periods, however, some guidelines are suggested. **Do not operate piston and MR motors at more than 75% of free speed.** Consult the factory for applications requiring continuous operation of rotary vane motors at maximum HP or for any applications requiring vertical operation of these motors. Review service manuals carefully.

For two known and one unknown, the following formulas can be used:

$$\text{ft. lbs. Torque} = \frac{1000 \times \text{HP}}{0.19 \times \text{RPM}}$$

$$\text{Horsepower (HP)} = \frac{0.19 \times \text{Torque (ft. lbs.)} \times \text{RPM}}{1000}$$

$$\text{Speed (RPM)} = \frac{1000 \times \text{HP}}{0.19 \times \text{Torque (ft. lbs.)}}$$

When working with Newton meters (Nm), substitute 10255 in place of 0.19 in the formula.

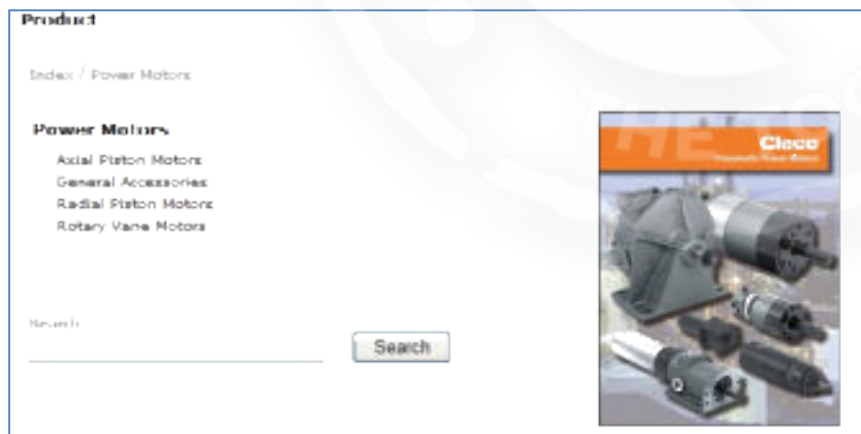
Use the performance charts provided for each motor size and type for obtaining this same data procedure:

1. Select operating pressure.
2. Select torque required from the left hand scale.
3. Extend that point position across chart until it intersects with torque performance curve of the selected pressure.
4. Draw a vertical line from the above mentioned intersection to the corresponding motor scale at the bottom of the chart to determine the operating speed at the required torque and gpg pressure.
4. Extend the vertical line until it intersects the horsepower curve of selected operating pressure and read horsepower from the motor scale on the right side of the chart.

Torque and horsepower curves may be interpreted for approximate performance at other gpg pressure.

Motor selection information & guides located in catalog & Technical Service Reps only a phone call away for assistance

Service literature, online catalogs & other information is always available on our website





# **Appendix**

# Vision & Values



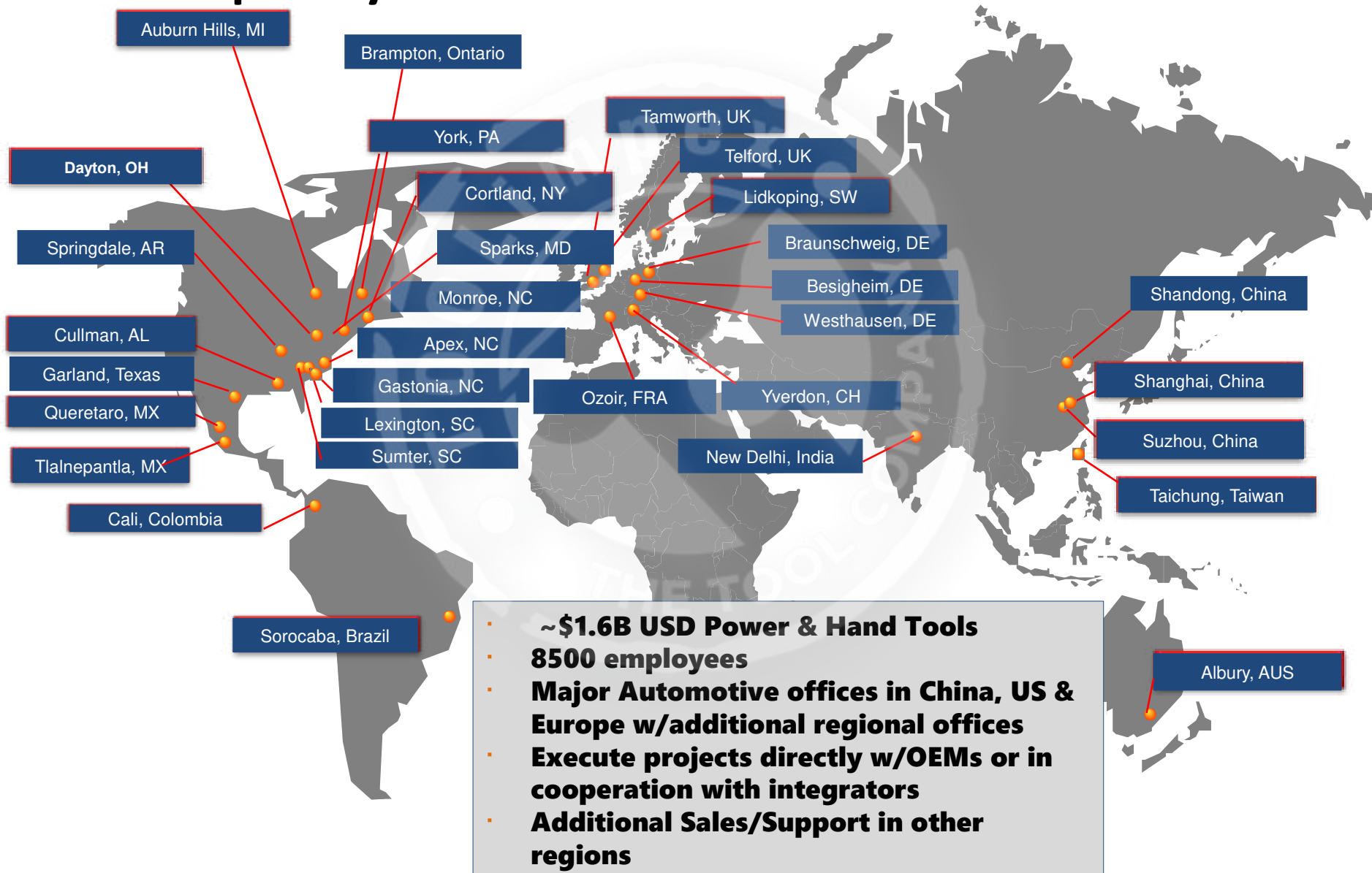
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- Customers come first
- Integrity in all we do
- Continuous improvement
- Innovation for growth
- Best talent – one team

# Company Overview

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# Company Overview



Durability. Dependability. Industry  
leading technology.

- Apex Tool Group Management foundations in Danaher and Cooper Industries (2010)
- Industrial, commercial, and do-it-yourself customers
- Unparalleled selection of over 30 leading brands with over 100 years of tools experience: DGD, Cleco, Dotco, Apex, Recoules, Quackenbush and more
- Over \$1.6B in annual sales
- Over 8500 employees
- World's largest tools company

# Brands Portfolio

**Cleco®**

Durability. Dependability. Industry leading technology.

**DGD**



**Cleco®**



**DOTCO**



**APEX**



*Airetool*



**Recoules®**



**Quackenbush**



**MP Master Power**

**GETA**

**UTICA**

# History of Apex Tool Group Business System

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## Standard Business Tools

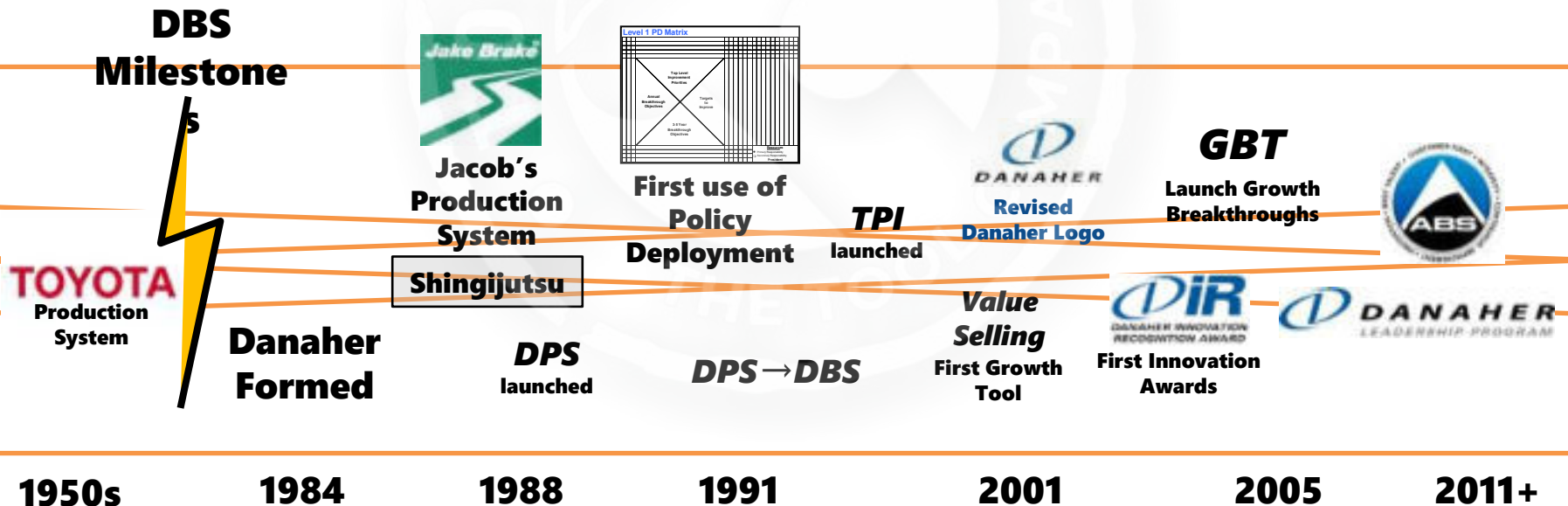
**DBS/ABS Evolution**

**Lean Manufacturing only**

**Lean Manufacturing + Transactional**

**Lean + Growth**

**Growth + Lean + Leadership**



# History of Apex Tool Group Business System



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The European Power Tools headquarter in Westhausen provides the development and production of the Cleco pulse tools series, the Cleco LiveWire- and the DGD series. Additionally, it is a sales and service center for the complete portfolio of the Power Tools sector. The concentrated know-how at this site is complemented by the software development center for DGD- and Cleco tightening technology as well as standard- and customer-specific software solutions. The Apex Tool Group is focused on presenting solutions in a competitive price range to the world market of



# History of Apex Tool Group Business System



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With more than 50 years of experience in compressed air- and electric tools and the thoroughness as well as know-how of technicians and engineers, the Apex Tool Group Competence Center has risen to a serious benchmark. Our portfolio includes hand- and electric tools, solutions for torque measurement, metal cutting, drilling applications and ventilation systems as well as professional electronic tools. Due to a new innovative power, Westhausen offers the entire range of high quality industrial tools and adequate accessories.

Whatever demand you will make ...

...we will fulfill it with our brands!



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